Appendix P

Water Supply Assessment

Water Supply Assessment
Ocotillo Express Wind Farm

June 8, 2011

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Acronyms and Abbreviations

af	acre-feet
afy	acre-feet per year
BLM	U.S. Department of Interior Bureau of Land Management
CDPH	California Department of Public Health
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
County	County of Imperial
DWR	California Department of Water Resources
EIR	Environmental Impact Report
EPA	Environmental Protection Agency
FDB	Food and Drug Branch
gpd	gallon per day
gpm	gallons per minute
GPS	Global Positioning System
H&SC	Health and Safety Code
HA	Hydrologic Area
HR	Hydrologic Region
O&M	Operations and Maintenance
PWS	Public Water System
SB 610	Senate Bill 610
SDCWA	San Diego County Water Authority
taf	thousand acre-feet
UWMP	Urban Water Management Plan
WSA	Water Supply Assessment

1 Executive Summary

This report and Water Supply Assessment (WSA) has been prepared to assist Imperial County in meeting the requirements of Senate Bill 610 (SB 610) for the Ocotillo Express LLC Wind Farm (proposed project) in Imperial County. The proposed project is located on approximately 15,000 acres, the majority of which are lands administered by the U.S. Department of Interior Bureau of Land Management (BLM), and a small portion of which will be leased from a private land owner. The proposed project will be constructed in two phases that will include 158 wind turbines, access roads, an Operations and Maintenance Building, and other support facilities.

Imperial County is the lead agency for the California Environmental Quality Act (CEQA) and no Public Water Supplier (PWS) has been identified. Although Imperial County did not request the WSA, it is being prepared voluntarily to assist in the determination of adequacy of water supply for the proposed project and as supporting documentation to the Environmental Impact Report (EIR).

The proposed project will not be connected to or receive water from a PWS. Water for construction demand (50 acre-feet), toilet flushing (0.18 acre-feet per year) and fire suppression (0.03 acre-feet) will be purchased from a private well located near Pine Valley in San Diego County. The well water provided for toilet flushing is not a confirmed source of potable water, and no water will be used for hand washing. Hand sanitizers will be provided on site.

The private well is located in the Barrett Lake Hydrologic Area, which is within the Tijuana River Valley Watershed. The well may be drawing water from the underlying alluvial aquifer and/or fractured rock found deeper below. The groundwater basin that is ultimately affected by water being drawn from this well is the Tijuana Groundwater Basin. This is located within the South Coast Hydrologic Region (HR) and is not considered to be in a state of groundwater overdraft due to current or proposed future uses. The basin is non-adjudicated and the well owner has no restrictions on the yield from his well.

The private well is located within the Campo-Cottonwood Sole Source Aquifer (SSA) Designated Area. However, the proposed wind energy project is not located at this aquifer. The proposed project lies above the Ocotillo/Coyote Wells SSA; thus, the *Hydrological and Environmental Hazard Assessment* addresses the construction and operational conditions that may be reviewed by the Environmental Protection Agency under the SSA Program, specific to the Ocotillo/Coyote Wells SSA.

Operational demand also includes drinking water (0.01 acre-feet per year) which will be purchased from a privately-owned bottled water plant/distributor licensed by the California Department of Public Health (CDPH) Food and Drug Branch (FDB). Drinking water will be delivered in 5-gallon bottles for use in water coolers. No other operational demands are anticipated.

2 Introduction

This report presents the Water Supply Assessment (WSA) prepared for the Ocotillo Express Wind Farm project (proposed project) in accordance with Senate Bill 610 (SB 610). The project site encompasses approximately 15,000 acres, the majority of which is located on U.S. Department of Interior Bureau of Land Management (BLM) administered lands and a small portion (26 acres) of which is private property. As part of the California Environmental Quality Act (CEQA), this project is undergoing an Environmental Impact Report (EIR). This report and WSA are furnished as a supporting documentation to the EIR.

2.1 Senate Bill 610

Senate Bill 610 became effective January 1, 2002, and requires cooperation and interaction between the CEQA lead agency and the water supplier for a proposed project. The intent of SB 610 is to strengthen the process by which local agencies determine the adequacy and sufficiency of current and future water supplies to meet current and future demands.

Imperial County is the CEQA lead agency and no Public Water Supplier (PWS) has been identified. However, Imperial County has not specifically requested that a WSA be completed. It is unclear as to whether or not the proposed project qualifies as a "project" as defined by California Water Code §10912 (a) and (b). California Water Code 10912 (a)(5), states that a "project" includes a "proposed industrial, manufacturing, or processing plant, or industrial plant planned to house more than 1,000 persons, occupying more than 40 acres of land, or having more than 650,000 square feet of floor area." The proposed project encompasses more than 40 acres, but the water demands are minimal and it is uncertain as to whether or not the proposed project qualifies as a "project" under the definition of Water Code §10912. However, the WSA is voluntarily being prepared as an informational document to assist the lead agency in evaluating the adequacy of water supplies for the proposed project.

2.2 Sole Source Aquifer Program

The Sole Source Aquifer Program was established under the Safe Drinking Water Act in 1974. It is used by communities to help prevent contamination of groundwater from federally-funded projects. The SSA Program allows for Environmental Protection Agency (EPA) review of any project that is federally-funded to determine if there is a potential for contamination of the sole source aquifer.

Water for construction, fire suppression, dust control, and toilet-flushing will be supplied by a private sealed well with hydrant located near Pine Valley, within the Campo/Cottonwood SSA Designated Area. The existing private well does not constitute a project subject to review by EPA under the SSA Program and therefore, no additional analysis has been performed. Water will be withdrawn from this existing well within its historic usage and as allowed by the determination of the well as a legal nonconforming use for a water distribution business (see Appendix 1).

The proposed wind energy project is located inside the boundaries of the Ocotillo/Coyote Wells SSA. The *Hydrological and Environmental Hazard Assessment* was developed to address the construction and operational conditions that may be reviewed by the EPA under the SSA Program.

3 Project Description

The proposed project will include 158 turbines, approximately 41 miles of new access roads, an electrical collection system (to collect power from each wind turbine generator), a substation, an interconnection switchyard, an Operations and Maintenance (O&M) building, and underground power utilities throughout. Each of the turbines will have a hub height of 262.5 feet, a rotor diameter of 331.3 feet, a total height of 428.1 feet and a column width of 15 feet. These turbines will weigh approximately 350 tons. Construction will be completed in two phases. Phase 1 will include up to 137 wind turbines, the substation, switchyard, collection system, access roads, and the O&M building. The final phase will include additional wind turbines, access roads, and collection system for the remaining wind turbines. Figure 1 illustrates the proposed project site location.

The proposed project is located within the Ocotillo/Nomirage Community Area as defined in the Imperial County General Plan.

3.1 Proposed Project Construction Demand

During construction it is anticipated that a maximum of 50 acre-feet (af) of water will be needed over the entire construction period. This construction demand will be provided with a one-time purchase of construction water from a private well located near Pine Valley in an unincorporated portion of San Diego County. Water for construction purposes will be used primarily for concrete batching, dust control, and soil compaction. Potable drinking water for construction workers will be delivered daily by construction companies on their own trucks.

3.2 Proposed Project Operational Water Demands

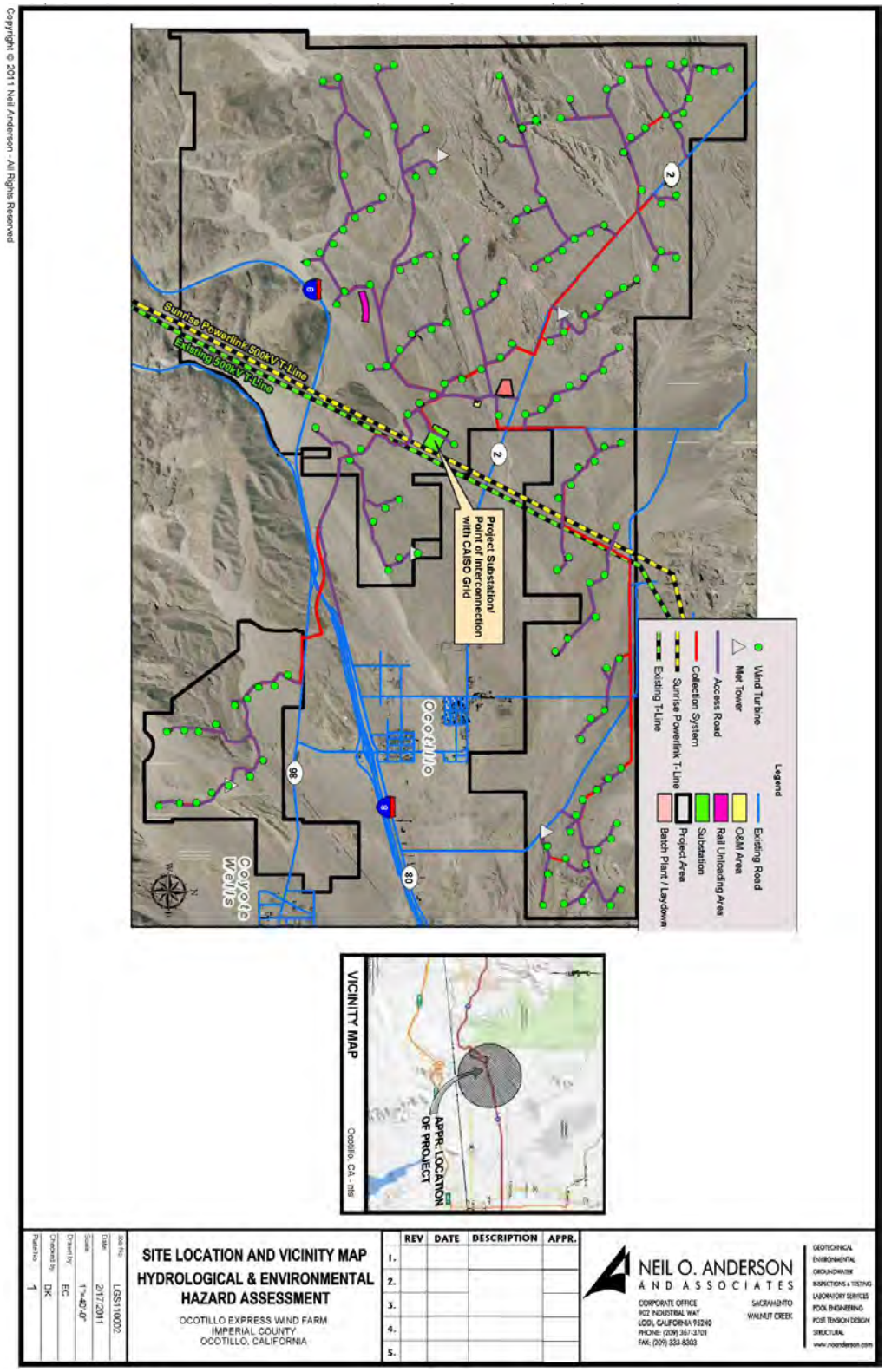
Demand for proposed project operations includes water for drinking, toilet flushing, and fire suppression.

Drinking water demand is nominal at 0.5 gallon per day (gpd) per employee. With seventeen (17) full-time employees, estimated drinking water demand is 8.5 gpd which equals 3,102 gallons per year, or 0.01 acre-feet per year (afy). Estimated water deliveries for drinking water total 3,129 gallons per year (0.01 afy) to meet that demand. The water will be supplied by a Bottled Water Distributor licensed by the California Department of Public Health (CDPH) Food and Drug Branch (FDB).

Water for toilet flushing is estimated at 0.18 acre-feet per year (afy). The private well near Pine Valley, which is not considered a potable supply, will provide this water. Water will not be provided for hand washing; hand sanitizers will be provided for employee use.

An additional 0.03 afy (10,000 gallons) for fire suppression will be stored in an on-site tank. The water for fire suppression will also be obtained in a one-time purchase from the private well near Pine Valley.

No other water demands are anticipated.


Legend
Wind Turbine
Met Tower
Access Road
Collection System
Sunrise Powerlink T-Line
Existing T-Line
Existing Road
O&M Area
Rail Unloading Area
Substation
Project Area
Batch Plant / Laydown
Project Substation/
Point of Interconnection
with CAISO Grid
Sunrise Powerlink 500kV T-Line
Existing 500kV T-Line
Ocotillo
Coyote Wells
VICINITY MAP
Ocotillo, CA - nts
APPR. LOCATION OF PROJECT
SITE LOCATION AND VICINITY MAP
HYDROLOGICAL & ENVIRONMENTAL
HAZARD ASSESSMENT
OCOTILLO EXPRESS WIND FARM
IMPERIAL COUNTY
OCOTILLO, CALIFORNIA
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4 Water Supply Assessment for the Ocotillo Express Wind Farm

4.1 Introduction

Roles of the Lead Agency and the Water Supplier

The County of Imperial is the CEQA Lead Agency responsible for evaluating the environmental impacts of the proposed project in compliance with CEQA, certifying the EIR, and approving the project. Should a PWS be identified, it is responsible for preparing the WSA. No PWS has been identified.

4.2 Compliance with Provisions of the Water Code

Senate Bill 610 (California Water Code Sections 10910-10915) requires that a WSA include the following:

- A description and quantification of existing and planned future water supplies;
- A description of the reliability and vulnerability of the water supply during a normal water year, single dry water year, and multiple dry waters year over a 20-year projection period;
- Documentation of the water supplier's water rights, contracts, and/or entitlements, and detailed information such as capital financing programs or regulatory approvals;

The following analysis presents the WSA for this proposed project in compliance with SB 610.

Is the project subject to California Environmental Quality Act [California Water Code Section 10910(A)]

The project is subject to CEQA and is undergoing an EIR. The County of Imperial is the lead agency and no PWS has been identified. Imperial County has not determined that a WSA is required for the proposed project; however, this WSA is being prepared voluntarily as supporting documentation to the EIR.

Is there a current Urban Water Management Plan?

There is no current Urban Water Management Plan (UWMP) for the identified water suppliers.

Identify existing water supplies for the proposed project [California Water Code §10910(D)]

The water for proposed project will be supplied by a private well located near Pine Valley in San Diego County. This well will supply the construction demand, operational demand for toilet flushing, and water for fire suppression.

Operational water demands for drinking water will be purchased from Bottled Water Distributors licensed by the California Department of Public Health (CDPH) Food and Drug Branch (FDB). The water will be delivered in 5-gallon bottles and stored in water coolers on site.

Document water rights

The private well near Pine Valley is designated a Water Distribution Business subject to the Nonconformity Regulations of the San Diego County Zoning Ordinance Section 6852 and Section 6864 (Existing Groundwater Extraction Operations). A copy of the Determination of Nonconforming Use is included in Appendix 1. There are no limitations on the volume of groundwater extractions for this well.

The operational demands for drinking water will be purchased from privately owned FDB licensed bottled water distributors located in Imperial County or nearby in San Diego County. The sources for bottled water companies can vary greatly and may include groundwater, municipal water, natural springs, and artesian wells. Possible water suppliers include Sparkletts, El Oasis Water Company, Roman's Water, or D&M Water Company.

4.3 Supply Reliability Analysis

Population, climate, and supply and demand information will be presented for both the proposed project area and for the basin from which the proposed project demands will be supplied.

Population

There are no existing residents in the proposed project area. The water supply for the proposed project is located between Pine Valley and Alpine in unincorporated San Diego County. Current and future population is combined for both cities and summarized in Table 1.

Table 1. Current and Future Population Projections for the Alpine and Pine Valley (combined).

Year	2008	2015	2020	2025	2030	2035
Population	19,248	19,549	20,358	22,311	23,873	25,994

Source: SANDAG, 2050 Regional Growth Forecast (data extracted on: 02/2011).Available at http://datawarehouse.sandag.org/ forecast demographics from Pine Valley and Alpine combined

Climate

Table 2 summarizes representative climate data for the proposed project area, including average monthly precipitation, temperature, and evapotranspiration (ETO). The proposed project area is located in an arid desert with hot, dry summers and mild winters. Annual average precipitation is less than three inches.

Table 2. Climate Data for Proposed Project Site													
Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Avg precip	0.51	0.36	0.31	0.05	0.03	0.01	0.06	0.32	0.36	0.35	0.17	0.43	2.96
Avg Temp	70.2	74.5	79.3	86.1	94	103.4	107.0	105.7	101.1	90.9	78.1	69.7	88.3
ETO	2.32	3.2	5.13	7.32	8.67	8.74	8.91	8.3	6.61	5.0	3.07	1.95	69.22

Sources: Precipitation and Temperature data from the National Oceanic and Atmospheric Administration (NOAA) National Climatic Data Center (NCDC), El Centro 2 SWW Station; Evapotranspiration data from California Irrigation Management System (CIMIS), El Centro Station.

Table 3 summarizes representative climate data for the basin from which proposed project demands will be supplied, including average monthly precipitation, temperature, and evapotranspiration (ETO). Annual average precipitation is approximately 18 inches.

Table 3. Climate Data for Water Supply Location													
Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Avg precip	3.49	3.44	3.92	1.26	0.47	0.2	0.16	0.27	0.42	0.85	1.72	1.99	18.19
Avg Temp	54.1	55.2	55.8	59.5	62.9	69.3	74.7	75.9	73.5	66.8	59	54.3	63.4
ETO	2.13	2.14	3.36	4.61	5.21	6.30	6.70	6.81	5.29	4.12	2.76	2.13	51.56

Sources: Precipitation and Temperature data from the National Oceanic and Atmospheric Administration (NOAA) National Climatic Data Center (NCDC), Alpine Station; Evapotranspiration data from California Irrigation Management System (CIMIS), Ramona Station.

4.3.1 Comparison of Available Water Supplies Versus Demand

Proposed Project Demands

The proposed project will require the following demands:

- Construction demand: 50 af
- Water for fire suppression: 0.03 af (10,000 gallons)
- Toilet flushing water demand: 0.18 afy
- Drinking water demand: 0.01 afy (3,102 gallons per year)

Water for construction will only be required during the construction period. Demand for fire suppression is anticipated only at the onset of the proposed project. Therefore, construction and fire suppression demands are listed in acre-feet. Construction demand (50 af) will be used primarily for concrete batching, soil compaction, and dust control. Drinking water during construction will be brought on site by construction companies for use by contractors. Water for fire suppression (0.03 af) will be stored on-site and used in case of fire for the duration of the project.

The operational water demands for the proposed project consist of drinking water for employees and water for toilet flushing. For drinking water, assuming a water ingestion of 0.5 gpd per employee, for 17 employees, the water demand is 8.5 gpd. The total volume of drinking water demand is 3,102 gallons per year, or 0.01 afy.

Water demand for toilet flushing, assuming 1.6 gallons per flush and 6 flushes per employee, is 0.18 afy. Water will not be used for hand washing. Hand sanitizers will be utilized at the proposed project site. No additional operational water demands are anticipated.

Available Water Supply

Two water supplies have been identified for the proposed project:

- An FDB licensed Bottled Water Distributor (for operational drinking water demands); and
- A private well Water Distribution Business located near Pine Valley in an unincorporated portion of San Diego County (for construction, fire suppression, and operational toilet flushing demands).

Drinking Water Supply

The water demands for drinking water for the proposed project will be purchased from water bottling plant/water bottle distributors licensed by the FDB, such as Sparkletts, El Oasis Water Co., D&M Water Co., or Roman's Water Co., or other licensed distributor. The water will be delivered in 5-gallon bottles and placed for use in water coolers at the proposed project site. Twelve (12) 5-gallon water coolers will be located on-site, for a total of 60 gallons per delivery, with estimated water delivery approximately once every 7 days.

Bottled water plants and distributors that operate and sell in California are governed by the following regulations:

- Health and Safety Code (H&SC)
    - Sherman Food Drug Cosmetic Law, H&SC Sections 111070 to 111198;
- Title 21, Code of Federal Regulations (21 CFR)
    - Beverages (Bottled Water): 21 CFR, Part 165.3 and 165.110;
    - Processing and Bottling of Bottled Drinking Water (Bottled Water GMP's), 21 CFR, Part 129;
    - Good Manufacturing Practices, 21 CFR, Part 110; and,
    - Food Labeling, 21 CFR, Part 101 and Part 102.33.

The quantity of bottled water and coolers required (625 bottles delivered per year, for 12 coolers) would typically service approximately 10 average households. Should a licensed FDB Bottled Water Distributor be unable to supply this amount, additional bottles will be secured from other licensed distributors as

required. The water supply to bottled water companies is unlikely to be affected by normal, single dry year, and multiple dry year events.

Water Supply for Construction, Fire Suppression, and Toilet Flushing

The private well near Pine Valley is not subject to groundwater pumping restrictions. Based on anecdotal data from the supplier, the well supply is unaffected by normal year, dry year, and multiple dry years conditions. Historically, the well has not experienced variation in supply even during drought years. Production from this well may only be limited by pumping (150 gpm) and storage (30,000 gallon tank). The well depth is approximately 200 feet below ground surface. It is cored and cased in upper alluvium near the surface and then fractured rock further below. The static water level is approximately 30 feet below ground surface. Water from this well is often used for construction demand for other projects and is not typically sold for human consumption; water quality information is not available for this well.

Although specific numbers for water supply for this well are unavailable, based on anecdotal evidence and historical use, the potential supply from this well is estimated to be approximately 121 afy (see Appendix 3). Existing demand from other users of this water supply may vary widely depending on season and construction projects; however, based on anecdotal evidence of historical water sales from this supplier, the estimated existing demand for the suppliers' other users is approximately 28 afy. For purposes of this analysis, this demand is estimated to grow at a steady rate for the next 20 years. Table 4 illustrates the operations demands over a 20-year projection period.

Table 4. Comparison of Water Supply and Demand over a 20-year Projection Period, for Normal, Single Dry, and Multiple Dry Years (afy)

	2012	2017	2022	2026	2032
Supply					
FDB Licensed Bottled Water Distributor	0.01	0.01	0.01	0.01	0.01
Private Well[1]	121	121	121	121	121
Total Supplies	121.01	121.01	121.01	121.01	121.01
Demand					
Other	28	33	38	43	48
Proposed Project (construction)	50[2]	0	0	0	0
Proposed Project (fire suppression)	0.03[3]	0	0	0	0
Proposed Project (toilet flushing)	0.18	0.18	0.18	0.18	0.18
Proposed Project (drinking water)	0.01	0.01	0.01	0.01	0.01
Total Demand	78.22	33.19	38.19	43.19	48.19
Difference (Supply minus Demand)[3]	42.79	87.82	82.82	77.82	72.82

[1]Estimated water supply available to the seller based on historical use and equipment limitations; however, the seller may or may not be withdrawing this supply from the well each year.

[2]One-time purchase for water for construction.

[3]One-time purchase for water for fire suppression (0.03 af = 10,000 gallons).

4.4 Groundwater Sources, Water Code §10910 (f)

The water supply for this proposed project includes groundwater; therefore, Water Code Section 10910 (f) requires that specific groundwater information be included in this WSA. Because there is no UWMP for this water supplier, detailed information and data on this groundwater source was compiled from a variety of resources, which are referenced below.

4.4.1 Basin Description [Water Code §10910(f)(1)]

The water supply for construction and operational demand includes groundwater from a private well located near Pine Valley in unincorporated San Diego County. The well is located in the Barrett Lake Hydrologic Area (911.3) of the Cottonwood-Tijuana Hydrologic Unit (18070305) (see Figure 2), within the larger Tijuana River Watershed (see Figure 3). Generally, wells in this area of San Diego County pull from fractured rock aquifers. These types of aquifers tend to have lower storage capacity in steeply sloped upland areas, with potentially higher storage in valley areas. Often, fractured rock aquifers are overlain by a layer of alluvium or weathered bedrock, which can further increase storage capacity of the aquifer (County of San Diego, 2007).

There is no groundwater basin directly beneath this private well. This hydrologic area feeds into Barrett Lake, which is a main recharge source for the Tijuana Groundwater Basin, which is located further west along the coast. This basin is designated as a groundwater basin within the DWR Bulletin 118, which is referenced in State Senate Bill 610 as a guidance document for assessing water supply. Because the waters from the well site (and hydrologic area) eventually serve to recharge the Tijuana Groundwater Basin, information on the Tijuana Groundwater Basin has been presented in this report. As required by State Senate Bill 610 the groundwater basin that is most affected by the proposed water supply site must be assessed. For this reason we are assessing the Tijuana Groundwater Basin even though it is not directly beneath the well location site.

Although no specific groundwater management plan has been created for Tijuana Groundwater Basin, the Binational Watershed Advisory Council is the lead group which oversees the vision for the overall Tijuana River Watershed basin (Appendix 2).

The Tijuana Groundwater Basin is located within the greater South Coast Hydrologic Region (HR). Listed below, for the remainder of Paragraph 4.4.1, is the description of the Tijuana Groundwater Basin excerpted directly from the Department of Water Resources (DWR) Groundwater Bulletin 118 (2006).

Tijuana Groundwater Basin

- Groundwater Basin Number: 9-19
- County: San Diego
- Surface Area: 7,410 acres (11.6 square miles)

Basin Boundaries and Hydrology

The Tijuana Groundwater Basin underlies the portion of the Tijuana River Valley that lies within California. The basin's southern boundary is the international border with Mexico. The eastern and northern boundaries are the contacts with semi-permeable Pleistocene and Pliocene marine deposits. The western boundary is the Pacific Ocean. The intermittent Tijuana River and several ponds are hydrologic surface features in the basin.

Water Bearing Formations

The water-bearing units in the basin are the San Diego Formation (SDCWA, 1997) and Quaternary age alluvium. The marine terraces can also be water bearing; however, these deposits are frequently above the regional groundwater surface.

Quaternary Alluvium

The most productive unit in the basin is the alluvium which consists of river and stream deposits of gravel, sand, silt, and clay. The thickness of the alluvium is less than 150 feet (Izbicki 1985) and averages about 80 feet thick (SDCWA 1997). Wells yield as much as 2,000 gpm, but the average yield is 1,000 gpm (SDCWA 1997). Groundwater in this unit is unconfined and the specific yield is about 15 percent (SDCWA 1997).

Southern San Diego Boundaries

Figure 2. Southern San Diego Ground Water Unit Boundaries Map showing the individual Barrett Lake Hydrologic Area (911.3). Not to be confused with the Tijuana River Watershed boundary map listed below. (Source: San Diego Regional Water Quality Control Board, Southern San Diego Ground Water Unit, http://www.swrcb.ca.gov/rwqcb9/water_issues/programs/ground_water_basin/southern.shtml .

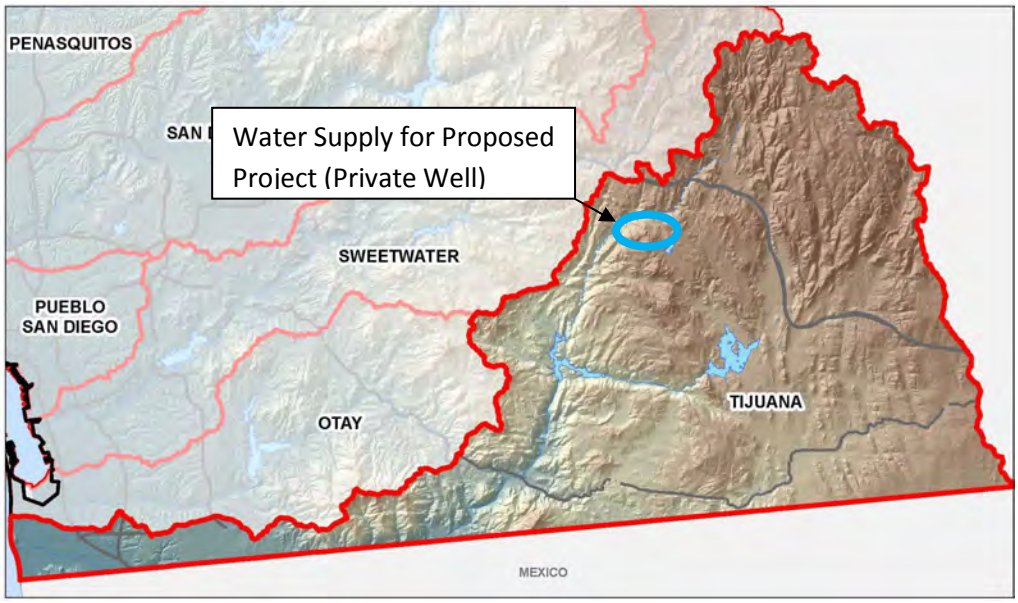

Figure 3. Tijuana River Watershed (United States Portion), with location of water supply for proposed project denoted. (Source: San Diego County Water Authority (SDCWA) *Integrated Regional Water Management Plan*, October 2007)

San Diego Formation

This unit consists of Pliocene age well-sorted, medium to coarse sand, silty and clayey sand, sandy silt, and sandy clay (Huntley and others 1996). Thickness of this unit ranges to at least 1,700 feet in the basin (Dudek and Associates 1994). Well yields average about 350 gpm with discharges as high as 1,000 gpm being recorded. Groundwater in the San Diego Formation is confined with a storage coefficient of about 0.001 (SDCWA 1997).

Restrictive Structures

The La Nacion fault and several smaller faults cross the basin. The smaller faults may be associated with the Rose Canyon fault, located 20 miles north of the basin (Wiegand, 1970). Faulting has probably contributed to difficulty in correlating deep well logs in the basin (Izbicki 1985). It is unknown whether these faults impede groundwater movement within the basin.

Recharge Areas

Recharge to the basin is mainly from the Tijuana River and controlled releases from the Barrett and Morena Reservoirs in San Diego County and Rodriguez Reservoir in Mexico. Some applied irrigation waters recharge the basin by deep percolation and discharges from septic tanks also contribute to Hydrologic Region South Coast recharge. The irrigation water accounts for more than one third of the recharge in the basin (DWR 1984).

Groundwater Level Trends

Water levels declined in the alluvial aquifer during the 1950s through the early 1970s, eventually reversing the historical westward groundwater flow. This reversal allowed seawater to infiltrate the alluvial aquifer and move eastward, degrading the groundwater quality and the productivity of agriculture in the western part of the valley (Dudek and Associates 1994). Changes in pumping in the 1970s allowed water levels to rebound. By the early 1990s, groundwater had resumed its historical flow direction (Dudek and Associates 1994).

Groundwater Storage

Groundwater Storage Capacity. Groundwater storage capacity is about 50,000 to 80,000 af (DWR (1984).

Groundwater in Storage. DWR (1984) assumed a 5,000-acre surface area for the basin, and estimated storage to be between 50,000 and 80,000 af. However, these estimates are based on slightly different basin boundaries than in this report.

Groundwater Budget (Type A)

San Diego County Water Authority (1997) reports about 1,500 af/yr of groundwater is pumped from the Quaternary alluvium and extraction data for the San Diego Formation are not available.

Groundwater Quality

The alluvium contains water of sodium chloride character. TDS content for this water typically ranges from 1,120 to 3,620 mg/L, although, less than 1,000 mg/L is found beneath some side canyons (Izbicki 1985). Groundwater in the San Diego Formation is sodium chloride in character and TDS content ranges from 380 to 2,360 mg/L (Izbicki 1985). Chloride and sulfate concentrations have exceeded the MCL in some wells in the basin (Izbicki 1985). The MCL for aluminum, barium, lead, selenium, and silver concentrations are exceeded individually in some wells in the basin (Dudek and Associates 1994).

4.4.2 Is the Basin Adjudicated? [Water Code §10910(f)(2)]

The Tijuana Groundwater Basin is not one of the twenty-two (22) adjudicated groundwater basins within the State of California.

4.4.3 Is there a State of Overdraft? [Water Code §10910(f)(2)]

The South Coast Hydrologic Region is not listed as an aquifer or basin that is in a state of overdraft. Below are the details for the region as described in the DWR Groundwater Bulletin 160 (DWR, 1998).

California Hydrologic Regions – Overdraft Assessment

In an average year, about 30 percent of California's urban and agricultural applied water is provided by groundwater extraction. In drought years when surface supplies are reduced, groundwater supports an even larger percentage of use. The amount of water stored in California's aquifers is far greater than that stored in the State's surface water reservoirs, although only a portion of California's groundwater resources can be economically and practically extracted for use.

In wet years, recharge into developed groundwater basins tends to exceed extractions. Conversely, in dry years, groundwater basin recharge tends to be less than groundwater basin extraction. By definition, overdraft is not a measure of these annual fluctuations in groundwater storage volume. Instead, overdraft is a measure of the long-term trend associated with these annual fluctuations. The period of record used to evaluate overdraft must be long enough to produce data that, when averaged, approximate the long-term average hydrologic conditions for the basin. Table 5 (Table ES3-2 in DWR Bulletin 160-98) shows the Department's estimates of 1995 and 2020-level groundwater overdraft by hydrologic region. Within some regions, overdraft occurs in some well defined subareas, while additional groundwater development potential may exist in other subareas.

Table 5 (as appears as Table ES3-2 in DWR Bulletin 160-98)
1995 and 2020 Level Overdraft in Hydrologic Region (taf)

	1995		2020	
Region	**Average**	**Drought**	**Average**	**Drought**
North Coast	0	0	0	0
San Francisco Bay	0	0	0	0
Central Coast	214	214	102	102
South Coast	0	0	0	0
Sacramento River	33	33	85	85
San Joaquin River	239	239	63	63
Tulare Lake	820	820	670	670
North Lahontan	0	0	0	0
South Lahontan	89	89	89	89
Colorado River	69	69	61	61
Total (rounded)	1,460	1,460	1,070	1,070

Tijuana River Valley Watershed/Groundwater Basin – Overdraft Assessment

There has been a great deal of research performed on the Tijuana Groundwater Basin to determine the state of the groundwater within the area as a whole. Based on the most current studies found, as well as our own analysis of the area, it appears that there is annual groundwater recharge that is nearly 2 to 3 times larger than the amount being pumped. Below, for the remainder of Paragraph 4.4.3, is the detailed information excerpted directly from the Hydrogeological Assessment of the Tijuana River Valley (Rempel, 1992).

Geography

The Tijuana River hydrologic subarea in southern San Diego County includes approximately 7,000 acres extending from the Mexican Border to the Pacific Ocean. The alluvial aquifer underlying the Tijuana River Valley occupies an area of about 5,000 acres to depths of 100 feet or more. This hydrologic subarea lies at the downstream end of a 1,700 square mile watershed, of which about 30 percent lies in the United States and 70 percent in Mexico.

Rainfall

The average annual rainfall across the watershed ranges from about 11 inches near the coast to 25 inches at the higher inland elevations (Izbicki, 1985). Thus an average rainfall year represents a potential recharge of up to 4,500 acre-ft in the 5,000 acre alluvial aquifer. The average annual pan evaporation for the City of Chula Vista is about 64 inches (Zedler and Norby, 1986). Most rainfall usually occurs during the months of December through March when evapotranspiration is at a minimum. Considerable variability in rainfall patterns between extremely wet and very dry years is evident in records for the City of San Diego dating back to 1800.

Surface Water Hydrology

Intermittent flood flows are highly variable and are dependent upon rainfall amounts and intensity across the watershed. Brief periods of very high flows, primarily during the rainy season (December through March), are often followed by low (or no) summer flows. During periods of ground water overdraft, surface waters will provide recharge to the aquifer in direct proportion to the available storage. However, when the aquifer is full or overflowing, ground water seepage into the lower Tijuana River will create "gaining" stream conditions. Such conditions are apparent when ponds and stream flows in the valley are maintained in the absence of surface water input from Mexico.

Intermittent flood flow volumes also depend in part upon the operation of water supply reservoirs upstream which together control about 75% of the watershed. There are three such dams in the Tijuana River watershed. The two which lie farthest upstream (Barrett and Morena) are within the United States. The third (Rodriquez) is located south of Tijuana, Baja California, Mexico. The dams were all constructed prior to 1936 and are operated primarily for water supply rather than flood control.

According to US 'Geological Survey (Izbicki, 1985), the average annual discharge in the Tijuana River at the International Boundary from 1936 through 1981 was about 33,000 acre-ft/yr, compared to a "median" discharge of 659 acre-ft/yr. The maximum annual discharge was recorded during the 1979-80 water year when 586,000 acre-ft flowed through the lower Tijuana River Valley (Izbicki, 1985).

Groundwater Hydrology

The alluvial aquifer of the Tijuana River Valley is recharged primarily by direct rainfall, subsurface inflow from adjacent areas, and intermittent flood flows (Department of Water Resources, 1967). Rainfall and flood flows were discussed previously. The amount of ground water inflow from across the International Border has been estimated as 1,580 acre-ft/yr (Department of Public Works, 1952); 1,208 acre-ft/yr (OS Army Corps of Engineers, 1965); and 1,160 acre-ft/yr (International Boundary and Water commission, 1976). There is also potential recharge from water bearing zones east of Interstate 5 which has not been estimated.

The chief factors contributing to reduction of ground water in storage are agricultural pumping and evapotranspiration from phreatophytes. Ellis and Lee (1919) noted the possibility of minor outflow from the basin toward the north during periods of high ground water. The amount of ground water outflow along the ocean/freshwater interface is not known.

It is only when the amount of ground water removed from a basin chronically exceeds natural recharge from rainfall, subsurface inflow, and intermittent flood flows that the ground water table will begin to trend downward. The record for the lower Tijuana River Valley from 1965-1978 shows that once the rate of ground water extractions are reduced, ground water levels will recover even during an extended period of drier than normal rainfall and less than normal runoff (1965-1978).

Safe Yield

The best practical approach for determining whether or not future ground water level declines are likely, given the current rate of consumption, is to determine the hydrologic balance between total annual recharge and total annual losses. As an estimate of the average replenishment, the "safe yield" represents the rate at which ground water can be withdrawn from an aquifer without causing a long-term water table decline (Bouwer, 1978).

Published estimates of safe yield in the Tijuana River hydrologic subarea range from 5,500-6,000 acre-ft/yr (International Boundary and Water Commission, 1976) to 7,900 acre-ft/yr (Ellis and Lee, 1919). The Department of Water Resources (1975a) reported a natural recharge rate of 8,000 acre-ft/yr. Although one can expect seasonal fluctuations, as long as the total amount of ground water removed stays within or below this range of "safe yield", there will be no adverse effects on-ground water levels in the study area. It should be noted these published estimates of "safe yield" do not include any contribution from untreated sewage flows.

Groundwater Levels

The effects of sustained pumping at rates twice the average annual natural recharge are readily apparent in hydrographs of wells published by the Department of Public Works (1952) and in the all-time low water levels measured in the early 1960's (Department of Water Resources, 1967). Assuming uniform distribution of drawdown over the 5,000 acre alluvial aquifer and an average specific yield of 0.2 (Izbicki, 1985), the 1950-1953 overdraft of 23,000-30,500 acre-ft could result in a ground water decline of 23-30 feet or more. Thus, it is not surprising that by the early 1960's, ground water table elevations across much of the valley had fallen below sea level.

Due to this lowering of the ground water table, highly saline ground water from underlying and adjacent marine sediments and sea water began to invade and to degrade the alluvial aquifer (Department of Water Resources, 1975b). This salt water degradation, which became apparent in the 1960'S, contributed further to the overall declining demand for ground water discussed above. As consumption eventually became less than natural recharge, the resulting annual surplus of supply began to overcome years of accumulated deficits. It is, therefore, not surprising that water levels began recovering as early as the mid-1960's following the all-time lows of the early 1960's.

Significant reductions in the amount of ground water needed for irrigation (due to the factors discussed above) allowed the aquifer to recover about 15 feet in the vicinity of Hollister Bridge and at least 36 feet near the International Border during the period from February 1963 through April 1969 (Ocean Science and Engineering, 1971). Although there were intermittent periods of increased rainfall and associated flood flows in the 1965-66, 1966-67, and 196B-69 water years, the extended dry period which began in the mid-1940's, continued until 1978 (San Diego County Water Authority, 1990).

The years 1978-1980 brought nearly 48 inches of rain to the city of San Diego and resulted in flood flows in the Tijuana River. The wet winter of 1982-83, filled the aquifer to capacity and turned the usually

intermittent Tijuana River into a series of interconnected ponds. Water levels in the ponds were maintained throughout the summer by ground-water inflow (Izbicki, 1985).

Conclusions

At present, average ground water losses (estimated extractions and estimated evapotranspiration) are less than 1/2 to 1/3 published estimates of annual natural recharge, which does not include any contribution from untreated sewage flows. Thus, any seasonal drawdown of ground water levels during summer and fall will be more than compensated for during a typical rainy season (December-March) and by subsurface inflow from neighboring water bearing sediments.

4.4.4 Groundwater Pumped from the Basin during the Past Five Years [Water Code §10910(f)(3)]

No information pertaining to the wells is specified with the Department of Health Services regarding the amount of water pumped over the last five years. Anecdotal evidence from the owner indicates that historically, approximately 20 to 28 afy has been pulled from the well.

4.4.5 Projected Groundwater to be Pumped from the Basin by the Water Supplier [Water Code §10910(f)(3)]

As described above, it is estimated that the water suppliers other demands will increase by approximately 5 afy every five years. Allowing for this projected increased demand, the supply exceeds all demands from other users and from the proposed project (see Table 4 above).

4.4.6 Groundwater Source – Summary

The private well near Pine Valley is approximately 200 feet deep; at this depth, it may be pulling from either the onsite upper alluvial aquifer, or fractured bedrock formation further below. The water in these formations supplies Barrett Lake (as well as any water formations that underlie Barrett Lake), which is a recharge source for the Tijuana Groundwater Basin. Therefore the DWR designated Groundwater Basin that is ultimately affected by pumping water from the site is the Tijuana Groundwater Basin. Based on the review of available data and documentation, existing pumping from the alluvial aquifer located within the affected groundwater basin (Tijuana Groundwater Basin) is estimated at 1,500 afy, while the safe yield from the aquifer may actually be as high as 5,500 afy to 7,900 afy. Natural recharge may be as high as 8,000 afy. For this reason the aquifer is not considered to be in a state of overdraft and thus there is no need for a program to mitigate overdraft.

The long term demand for the proposed project to be supplied by this well, as shown in Table 4, is 0.18 afy for toilet flushing, with one-time demands of 50 af for construction and 0.03 af for fire suppression at the beginning of the project. This demand is nominal when compared to the existing pumping demands, potential safe yield, and the recharge rate of either the alluvial aquifer alone, or the alluvial aquifer.

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Appendix 1

Determination of Nonconforming Use Letter

Private Well Near Pine Valley, California

3-3-03

GARY PRYOR
DIRECTOR
(619) 694-2962

County of San Diego

DEPARTMENT OF PLANNING AND LAND USE
5201 Ruffin Road, Suite B, San Diego, California 92123-1666
Information (619) 694-2960

San Marcos Office
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San Marcos, Ca 92069-2620
(760) 471-0730

El Cajon Office
200 East Main St. - Sixth Floor
El Cajon, Ca. 92020-3912
(619) 441-4030

March 3, 2003

Water Rights

Mr. Alfred E. Martin
24019 Japatul Valley Rd.
Alpine, CA 91901

Subject: Determination of Nonconforming Use for A Water Distribution Business on property Known as Assessor Parcel Number 406-251-06-00.

Dear Mr. Martin:

Based on the information you submitted, the Department of Planning and Land Use has determined that the Groundwater Distribution Business,(the selling or giving of water) located at 0000 Japatul Valley Rd. Assessor Parcel Number 406-251-06-00, can be considered legal nonconforming and therefore subject to the Nonconformity Regulations of the San Diego County Zoning Ordinance Section 6852. Existing Groundwater Extraction Operations as described in San Diego County Zoning Ordinance section 6864 may occur.

Please see enclosed Ordinance.

The Water Distribution Business consists of the following:

1. One legal water well and storage tank, with access off of Japatul Valley Rd.

Please retain a copy of this letter, as it will be the only evidence of this determination.

If you have any further questions regarding this matter, please contact me at (619) 441-4083.

Sincerely

Van L Ford
Code Enforcement Officer

"Prevention Comes First"

Appendix 2

Summary of Local Management Plan for Tijuana River Watershed

Source: San Diego County Water Authority, Integrated Regional Water Management Plan, 2007

Tijuana HU (911)	PLAN: Tijuana WMP	LEAD GROUP: 'SDSU Dept of Geography; Binational Watershed Advisory Council	2005
OVERVIEW: The Tijuana River watershed vision provides a framework for harmonizing data and stakeholder inputs. A vision describes the past, present, and desired future conditions of a watershed. It is interdisciplinary and combines data from scientists, social scientists, practitioners, and watershed stakeholders. The visioning process encourages stakeholder participation, and has been shown to be a successful way of creating realistic and sustainable watershed management plans (Montgomery and Sullivan 1995).			
DESCRIPTION: The Tijuana River Watershed (TRW) lies across the U.S.-Mexican international boundary and is approximately 1,750 square mile (4,465 square km) in area, with one-third in California and two-thirds in Baja California. The watershed is a place of natural and cultural beauty that is at risk from uncontrolled urbanization and infrastructure deficits. Growing human populations and land use changes have brought numerous environmental problems to the TRW region. These include: Decline in local groundwater quantity and further dependence on imported water; Decline in quality of surface and groundwater for human use; Increased erosion and flood dangers; Increased air pollution; Reduction in the amount of safe, open, and green areas for urban residents; Decline in ecosystem health; Increasing number of threatened and endangered plants and animals. In 2002 a binational team of researchers and practitioners, the Binational Watershed Advisory Council (BWAC), was convened to address these environmental challenges. The council identified stakeholders in the watershed who, in turn, participated in the development of this Binational Vision for the TRW, a snapshot of the current and desired conditions in the TRW. The stakeholders also helped to devise strategies and options for achieving that Vision. The Vision document contains baseline data and trends for the major areas of concern identified by stakeholders: water, air, ecosystems and natural resources, waste, and socioeconomic issues.			
PRIORITIES OR GOALS: The stakeholders of the Tijuana River Watershed desire to meet the needs of the present while protecting resources for future generations; to create a balance between natural resource protection, economic development, and quality of life; to proactively manage local surface and groundwater for long-term sustainability; to protect, restore, and connect habitats; to create a strong economic base for sustainable development; and to create human communities that allow people to enjoy the unique cultural and natural landscapes and functions of the watershed.			

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Source: SDCWA *Integrated Regional Water Management Plan, October,* 2007.

Appendix 3

Estimation of Supply and Demand for Private Well near Pine Valley

Water Supplier: Private Well Near Pine Valley

Estimation of Supply and Demand from Other Users:

1. Supply*

Well pump flow rate:	150	gpm
Potential operating period:	12	hours/day
Total volume:	108,000	gpd
	39,420,000	gpy
	121	afy

Assumptions:

*Restricted only by well pump equipment and potential operating period. Assumes no restrictions on owner's yield from aquifer, and based on verbal anecdotal evidence of potential pumping from well.

2. Demand by Other Users

High season use:	8100000	gallons (90,000 gpd for 3 months)**
Average use (not including high season):	1080000	gallons (90,000 gal each month on average)***
Total:	9180000	gallons
	28.17	afy

Assumptions:

**Highest usage of the well, recorded in 2010.

***In addition to the high season usage, assume an average of 90,000 gal/month in water sales, estimate only. Assumes seller sells volumes of tank 3 times per month (30,000 gal on site tank), based on verbal anecdotal evidence.

Information on well supply and demand data obtained from the owner through his water hauler via email and telephone exchanges in February 2011.